Molecular Foundry EH&S Policy and Procedure Statement # 2

Transport of Liquid Cryogen in Elevators

Problem:

Many Foundry researchers use liquid nitrogen in their research. A smaller number of researchers also use liquid helium. LN is transported in small, ambient pressure "Dewar flasks" or larger pressurized Dewars; LHe is usually transported in pressurized Dewars. LN is obtained from the large pressurized storage tank located next to the building. Liquid helium is usually delivered by a vendor directly to the laboratory.

It is frequently necessary to transport cryogen in the elevator. In the unlikely event of a power failure, a cryogen user and Dewer might be trapped in the small elevator for an extended period of time. If the Dewar vents, spills or leaks during this time, it is possible to induce an oxygen deficiency due to the displacement of oxygen by the evaporating, expanding cryogen. Ultimately, this could result in asphyxiation of the people riding in the elevator.

Relatively small quantities of liquid cryogen can cause significant displacement of oxygen in an enclosed environment. In a totally stagnant 500 cubic foot elevator, 5 liters of LN would evaporate to create about 123 cubic feet of gaseous nitrogen, reducing the oxygen concentration from 20.9% to as low as 15.7%. This degree of oxygen is not life threatening, but some effects of oxygen deficiency (increased breathing, difficulty thinking, fatigue) may occur. Assuming that the LN evaporated quickly (e.g., a spill or other Dewar failure) it would tend to form a blanket of cold nitrogen vapor at the floor that would be even more depleted of oxygen.

Policy

Liquid nitrogen and helium Dewars >4 liters will not be transported in occupied elevators.

Procedure

When ever possible, transportation of liquid cryogen in the elevators will be performed by two individuals. The user wishing to transport the cryogen will wait until the elevator empty and follow this procedure:

- Place the Dewar in the elevator, secured from rolling or tipping
- Post a sign inside the elevator:

Note:
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WARNING!
POTENTIAL FOR ASPHYXIATION!
Cryogen is being transported in this elevator
Do not enter or use elevator until the cryogen has been removed

Contact: _____ Floor: _____ Phone #:_____

- Send the elevator to the desired floor and either meet it there or have an assistant meet it there. Moves of 1-2 floors will probably be possible with one individual, moves of 3 or more floors will likely require the participation of 2 individuals.
- One sign will be assigned to each Dewar larger than 4 liters. When not in use, the sign can either be turned around or stored near the Dewar. In use the sign can be attached to the Dewar by a cord, Velcro or other reliable means.

Authorization

Developed by: Rick Kelly Date: 10/24/06

Reviewed by Molecular Foundry Safety Subcommittee: 10/27/06

Authorized by: Carolyn Bertozzi Date:

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